US Army Corps
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Engineer Research and
Development Center

Fact Sheet

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HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC) CONTROL SYSTEMS AND CONTROL PANELS

The Problem

Through field and laboratory research, the U.S. Army Construction Engineering Research Laboratory (CERL) has identified problems with heating, ventilating, and air-conditioning (HVAC) controls. The major problems include hardware performance and the complexity and variety of HVAC control schemes used in the field. Due to these problems, HVAC control systems are difficult and expensive to commission, operate, and maintain. Consequently, many Army HVAC systems may be operating out of calibration, consuming excessive amounts of energy, and providing uncomfortable working conditions.

The Technology

CERL developed design, installation, and commissioning guidance for HVAC panels. This guidance was coupled with the development of simple, efficient, factory-calibrated control panels. The standardized design of the panels allowed them to be easily applied to a variety of standard control systems.

As a follow-up to this work, CERL participated in the development of a Technical Manual (TM-5-815-3), Technical Instructions (TI-810-11), and Guide Specification (CEGS-15950) for HVAC control systems. These documents, written under the direction of the Corps of Engineers Huntsville Division, provide design, specification, installation, and documentation guidance for HVAC control systems.

The primary end-product is a standard control panel that can be readily applied to a variety of HVAC control applications. The standard panel contains industrial grade hardware in addition to state-of-the-art single-loop digital controllers. Due to standard input/output and functional requirements, the specified controllers are fully interchangeable between different control applications and manufacturers.

Benefits/Savings

Standardization concepts are presented and emphasized in the guide specification and technical manual. These documents: (1) provide for simplicity, effectiveness, and continuity in the design, specification, installation, and commissioning of Army HVAC control systems; (2) facilitate fabrication of standard control panels thus helping reduce costs; (3) provide for the use of high quality, reliable, and interchangeable hardware in the construction of control panels; and (4) provide guidance on hardware

installation and system commissioning; and (5) provide guidance on the development of operations and maintenance documents.

Energy efficient control strategies, coupled with accurate and reliable hardware, suggest an energy savings potential of up to 25 percent in heating and cooling costs.

Standardization provides similarity from one system to the next and functionally identical hardware from one control panel to the next. The end result is simplified operation and maintenance as well as reduced training requirements.

Status

The HVAC Control Systems Guide Specification and Technical Manual (superseded by the Technical Instructions) are complete and have been distributed to all Corps of Engineers districts. Proponent Sponsored Engineer Corps (PROSPECT) Training courses are being taught for HVAC Control System Design, HVAC Control System Quality Verification, and HVAC Controls Systems O&M based on the standard digital control systems. CERL also provides on-site standard HVAC Control Systems O&M training on a reimbursable basis

As of January 2000, CERL estimates there are over 10,000 control panels installed or contracted to be installed Corps-wide. Several Facilities Engineering Application Program (FEAP) User Guides are available. Those guides are entitled: *Standard HVAC Control Systems Retrofit Design*, FEAP-UG-FE-94/18; *Operation and Maintenance of Standard HVAC Control Systems*, FEAP-UG-FE-94/19; *Standard HVAC Control Systems Commissioning and Quality Verification*, FEAP-UG-FE-94/20. A FEAP Technical Report, *Standard HVAC Control Systems: Operation and Maintenance Techniques for Corps of Engineers Maintenance Mechanics*, (FEAP -TR-96/73) is also available.

Information regarding commercial availability of the standard digital HVAC control panels can be obtained from Johnson Controls Inc.; Barber-Colman (Siebe); ENTEC Services, Inc.; and Honeywell, Inc.

Points of Contact

CERL POC is Dave Schwenk, COMM 217-373-7241; toll-free 800-USA-CERL; FAX 217-373-6740; or CERL, ATTN: CECER-FL-E, P.O. Box 9005, Champaign, IL 61826-9005.

Johnson Controls, Inc., can be reached at COMM 314-878-4646; Johnson Controls, Inc., Federal Systems Group, 2188 Welsch Ind. Court, St. Louis, MO 63146.

Barber-Colman can be reached at COMM 815-877-0241; Barber-Colman, Environmental Controls Division, P.O. Box 2940, Loves Park, IL 61132-2940.

ENTEC Services, Inc., can be reached at COMM 309-697-2122; ENTEC Services, Inc., 4300 Entec Drive, Bartonville, IL 61607.

Honeywell, Inc., can be reached at COMM 612-870-5413; Honeywell, Inc., Honeywell Plaza 27-5205; Minneapolis, MN 55408-1792.

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